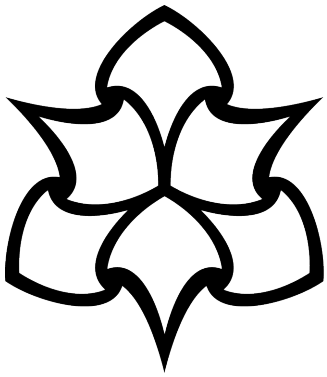
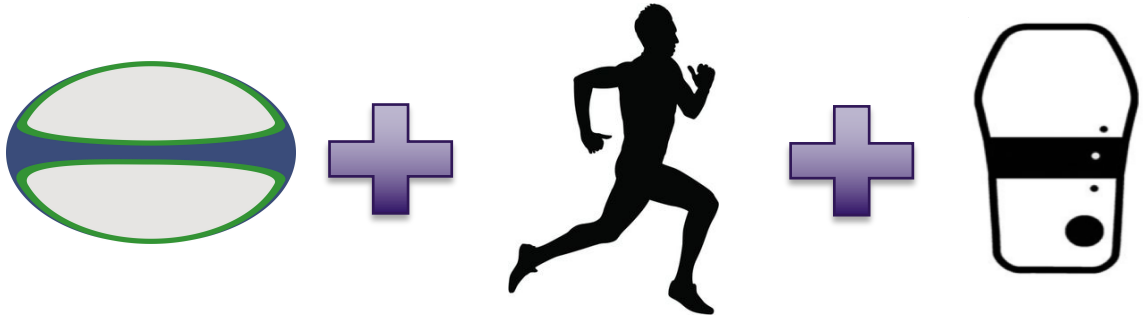


A COMPARISON OF THE MAXIMUM LOCOMOTOR INTENSITIES IN AGE-GRADE INTERNATIONAL AND ACADEMY RUGBY UNION



Dale Read[1,2], Kevin Till[1,2], Nicholas Dalton-Barron[1,3], Grant Beasley[4] & Ben Jones[1,2,5]

[1]Leeds Beckett University, [2]Yorkshire Carnegie Rugby Union Football Club, [3]Catapult Sports, [4]The Rugby Football Union, [5]The Rugby Football League

CATAPULT

England Rugby

LBU LEEDS BECKETT UNIVERSITY

YORKSHIRE CARNEGIE RUGBY

ECSS DUBLIN 2018

@DaleRead4

England Rugby

U18 Rugby Union in England

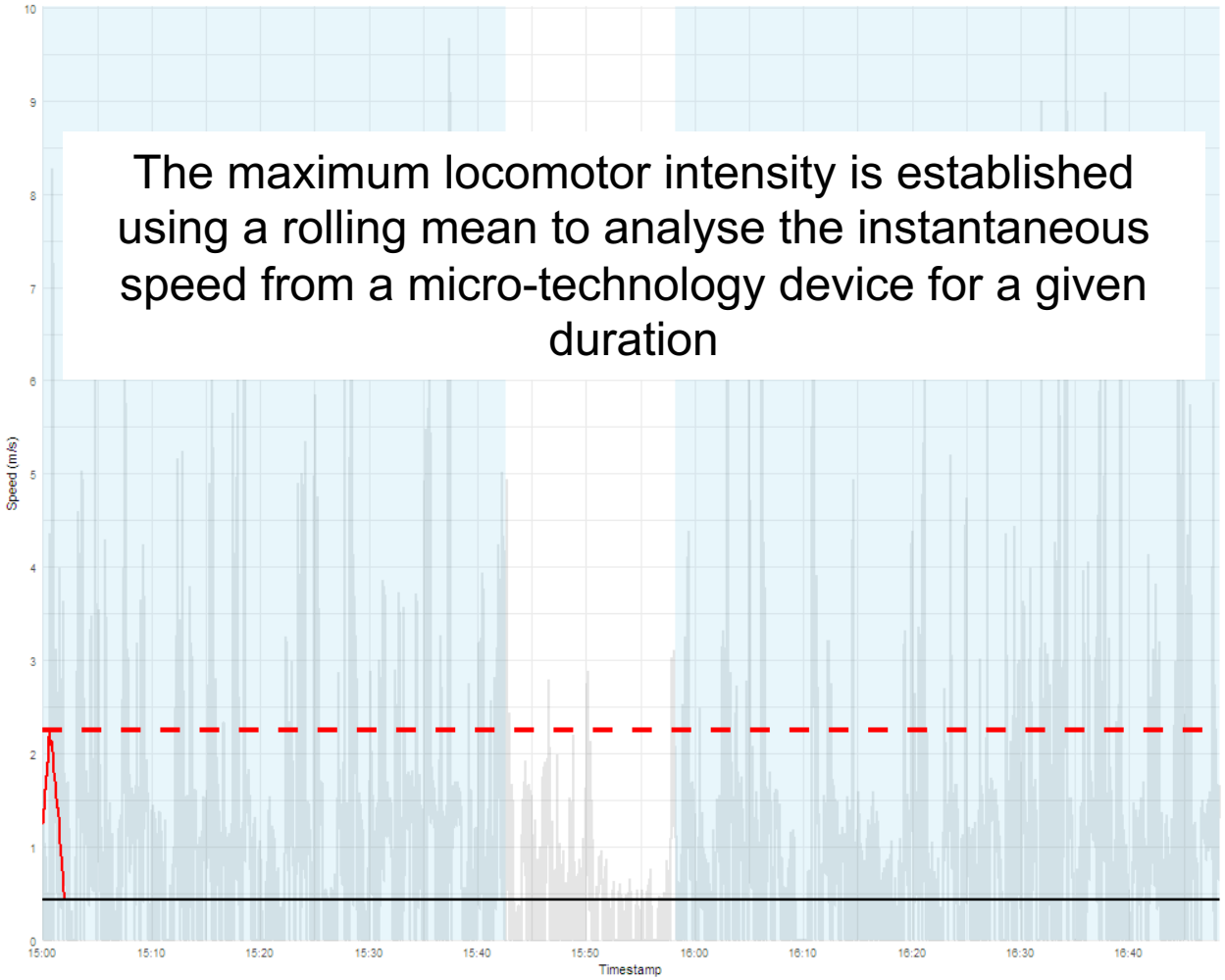
Amateur Club

School

Academy

The ‘Performance Pathway’

International



The maximum locomotor intensity is established using a rolling mean to analyse the instantaneous speed from a micro-technology device for a given duration

@nickdalts

LEEDS BECKETT UNIVERSITY

1. To quantify the maximum locomotor intensities from U18 international and academy rugby union matches

2. To compare the maximum locomotor intensities between U18 international and academy matches using two variables (relative distance and high-speed relative distance)

3. To compare the maximum locomotor intensities between U18 international and academy players that represented both playing levels


17.7 ± 0.5 years
17.6 ± 0.6 years
1 nation
142 participants
10-Hz S5 Optimeye Catapult
185.4 ± 7.3 cm
182.6 ± 9.5 cm
232 observations
7.17 Firmware 5.17 Sprint software
7 academies
93.2 ± 13.2 kg
92.6 ± 11.7 kg
16 participants represented both playing levels
Front row
2nd & Back
Scrum halves
Outside backs

1. Identify ‘playing time’ only
- Remove warm up, HT, bench, etc.
- 10-min minimum for inclusion

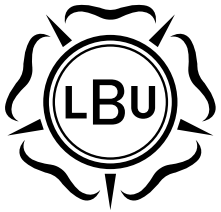
(Delaney et al., 2015, Read et al. 2018)

2. Export the instantaneous speed at 10-Hz

3. Use R to ‘clean’ the data
- >10 $m \cdot s^{-1}$
- <6 satellites
- >2.0 Horizontal dilution of precision

(Weston et al., 2015)

4. Use R to analyse data
- Relative distance & high-speed relative distance (>5.5 $m \cdot s^{-1}$)
- Rolling (0.1 s) mean
- 15 s, 30 s, 1, 2, 2.5, 3, 4, 5, 10-min (Read et al., 2018)



LEEDS BECKETT UNIVERSITY

Linear mixed model

- Random: ‘players code’ and ‘match code’
- Fixed: ‘group’ (international/academy and position)

- SWC established for each variable (0.2 between-subject standard deviation)
- (RD = 3.8%; HS·min^{-1} = 7.9%)

- Differences shown as Cohen’s *d* effect size (ES) ±90% confidence intervals

- Magnitude-based inferences calculated
- ‘Unclear’ when crossing the upper and lower bound of the SWC

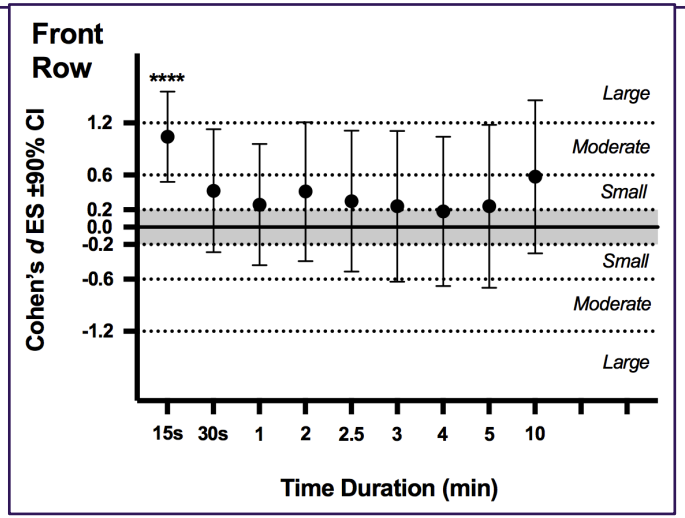
Batterham & Hopkins *IJSPP.* 2006;11,51-57.
Hopkins et al. *MSSE*. 2009;41(1),3-12

1. Maximal relative distance ($m \cdot min^{-1}$) (A) and high speed ($>5.5\ m \cdot s^{-1}$) relative distance ($m \cdot min^{-1}$) (B) for international and academy rugby union players by position and time duration.

A	Front Row		Second & Back Row		Scrum Half		Outside Backs	
	International	Academy	International	Academy	International	Academy	International	Academy
15 s	268 ± 35	236 ± 21	281 ± 37	269 ± 26	317 ± 43	297 ± 41	316 ± 38	303 ± 39
30 s	197 ± 19	186 ± 17	206 ± 22	213 ± 22	238 ± 18	235 ± 33	231 ± 25	233 ± 33
1 min	154 ± 15	148 ± 16	161 ± 16	166 ± 14	189 ± 17	184 ± 17	178 ± 15	174 ± 25
2 min	127 ± 12	120 ± 17	131 ± 13	134 ± 13	158 ± 12	150 ± 22	143 ± 15	138 ± 20
2.5 min	119 ± 12	113 ± 16	122 ± 14	126 ± 13	145 ± 12	143 ± 23	134 ± 15	129 ± 18
3 min	112 ± 9	108 ± 16	113 ± 12	120 ± 14	138 ± 10	136 ± 22	127 ± 12	124 ± 70
4 min	106 ± 9	100 ± 15	108 ± 10	110 ± 14	131 ± 11	125 ± 15	119 ± 11	115 ± 15
5 min	98 ± 7	94 ± 13	100 ± 8	102 ± 14	122 ± 6	116 ± 13	113 ± 10	107 ± 15
10 min	87 ± 7	80 ± 11	89 ± 8	89 ± 11	109 ± 7	98 ± 13	101 ± 9	93 ± 12

B	Front Row		Second & Back Row		Scrum Half		Outside Backs	
	International	Academy	International	Academy	International	Academy	International	Academy
15 s	156 ± 64	96 ± 41	180 ± 61	153 ± 46	242 ± 70	203 ± 78	230 ± 60	212 ± 57
30 s	79 ± 31	49 ± 21	94 ± 32	79 ± 24	134 ± 40	111 ± 36	123 ± 29	119 ± 40
1 min	40 ± 16	26 ± 11	49 ± 16	44 ± 15	71 ± 24	62 ± 23	65 ± 15	65 ± 22
2 min	21 ± 8	14 ± 6	28 ± 10	25 ± 11	46 ± 12	34 ± 11	40 ± 10	38 ± 12
2.5 min	18 ± 7	11 ± 5	24 ± 9	21 ± 10	42 ± 13	30 ± 10	35 ± 8	34 ± 11
3 min	17 ± 6	10 ± 5	22 ± 9	19 ± 8	38 ± 11	27 ± 9	33 ± 7	30 ± 10
4 min	13 ± 5	8 ± 3	19 ± 7	17 ± 8	33 ± 10	21 ± 6	27 ± 6	25 ± 8
5 min	11 ± 4	7 ± 3	16 ± 6	14 ± 7	28 ± 9	18 ± 5	24 ± 6	21 ± 7
10 min	7 ± 3	5 ± 2	10 ± 4	9 ± 5	19 ± 6	13 ± 4	17 ± 4	15 ± 5

Data are presented as mean ± standard deviation.

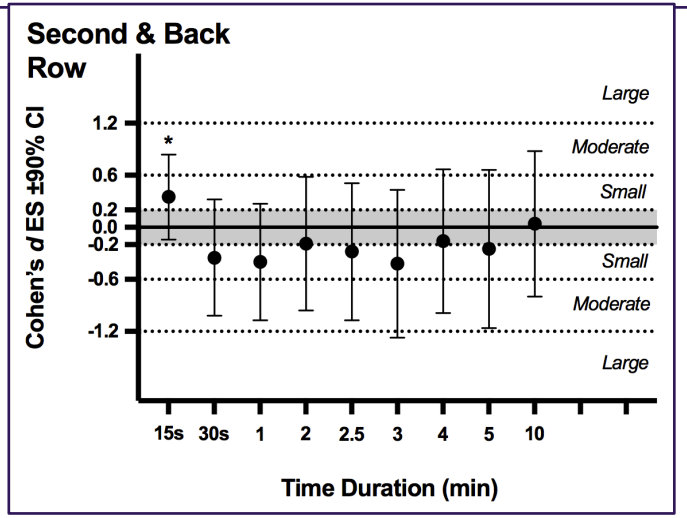


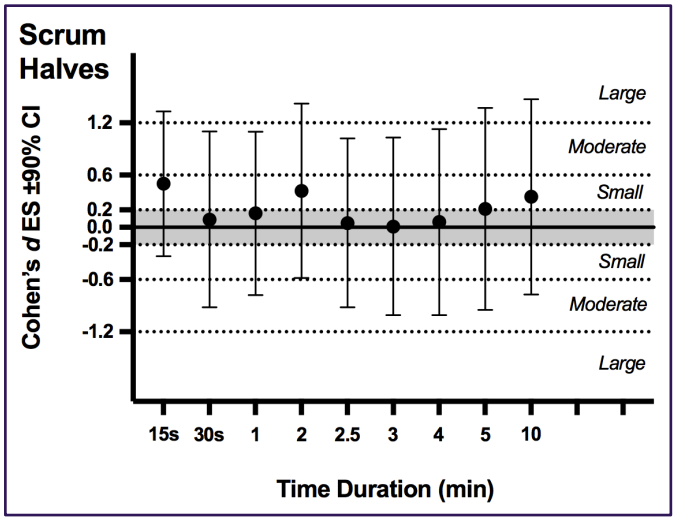
2.

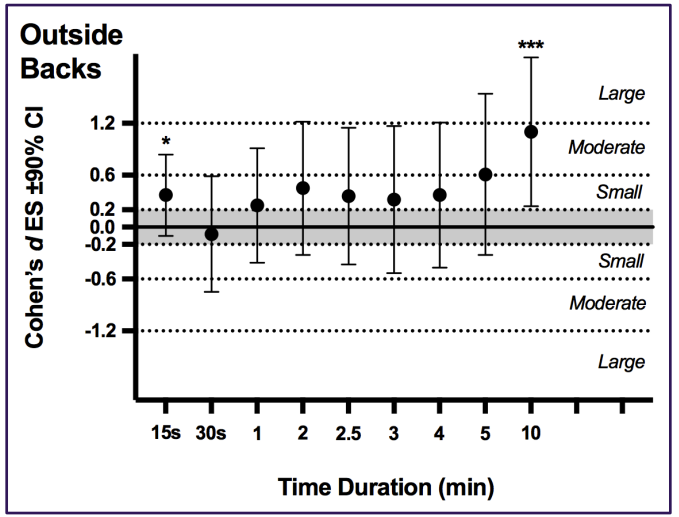
International vs. Academy

Relative distance

* = Possibly
** = Likely
*** = Very Likely
**** = Almost Certainly





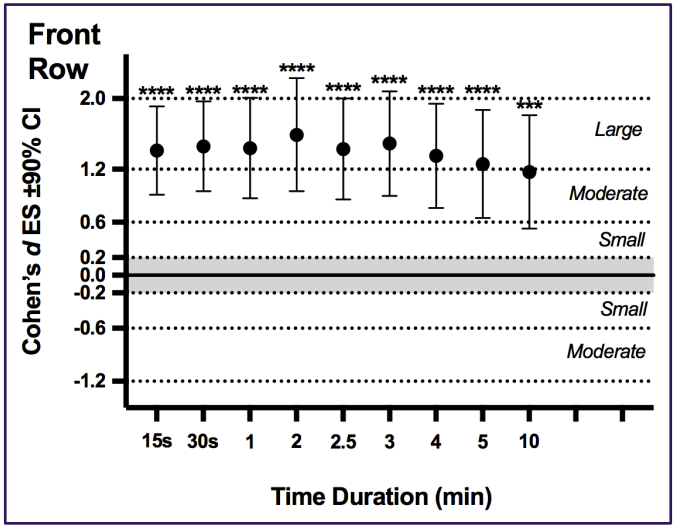


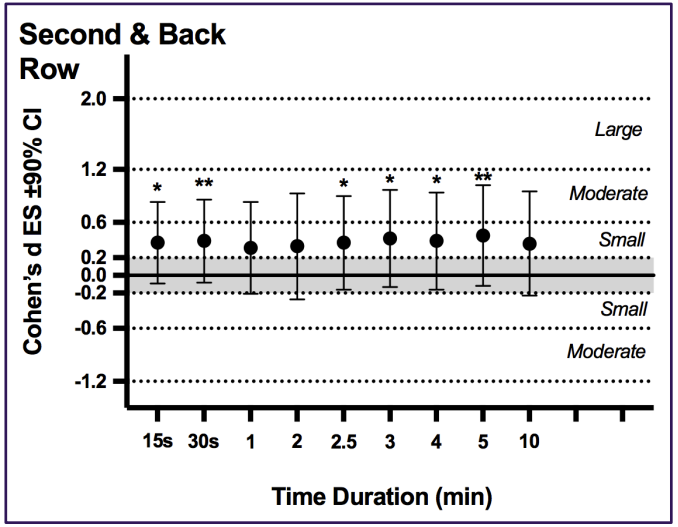
2.

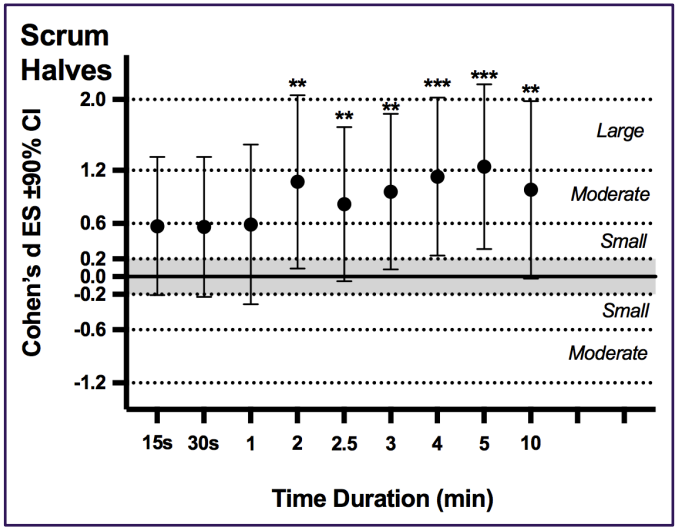
International vs. Academy

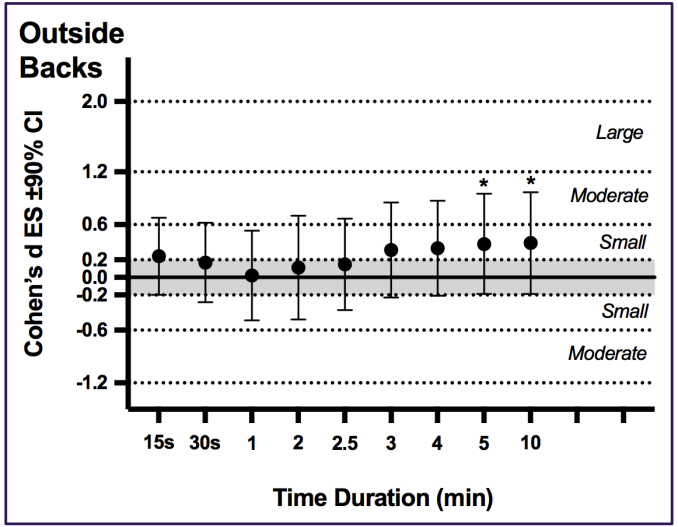
High-Speed Relative distance (>5.5 m·s^{-1})

* = Possibly
** = Likely
*** = Very Likely
**** = Almost Certainly

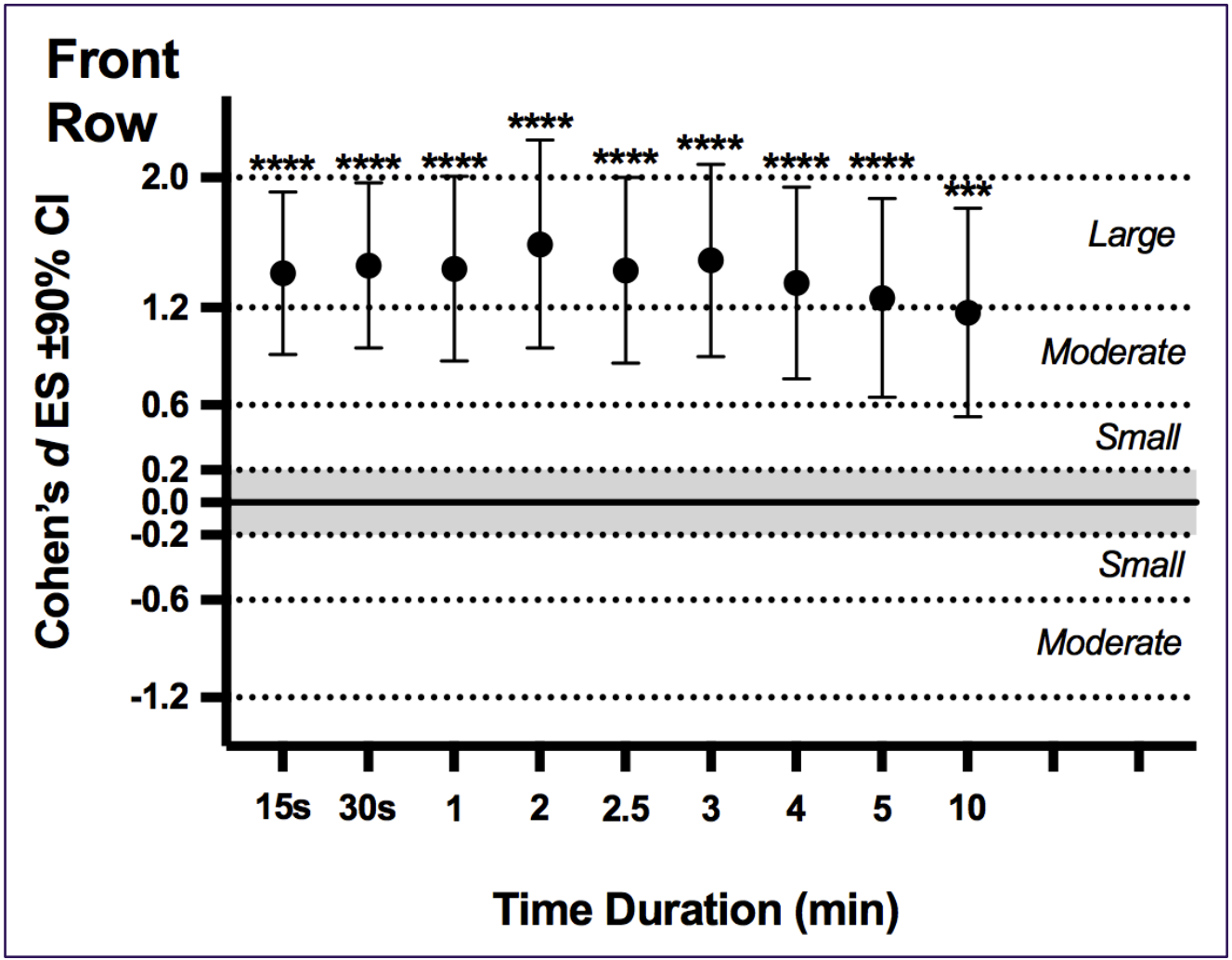




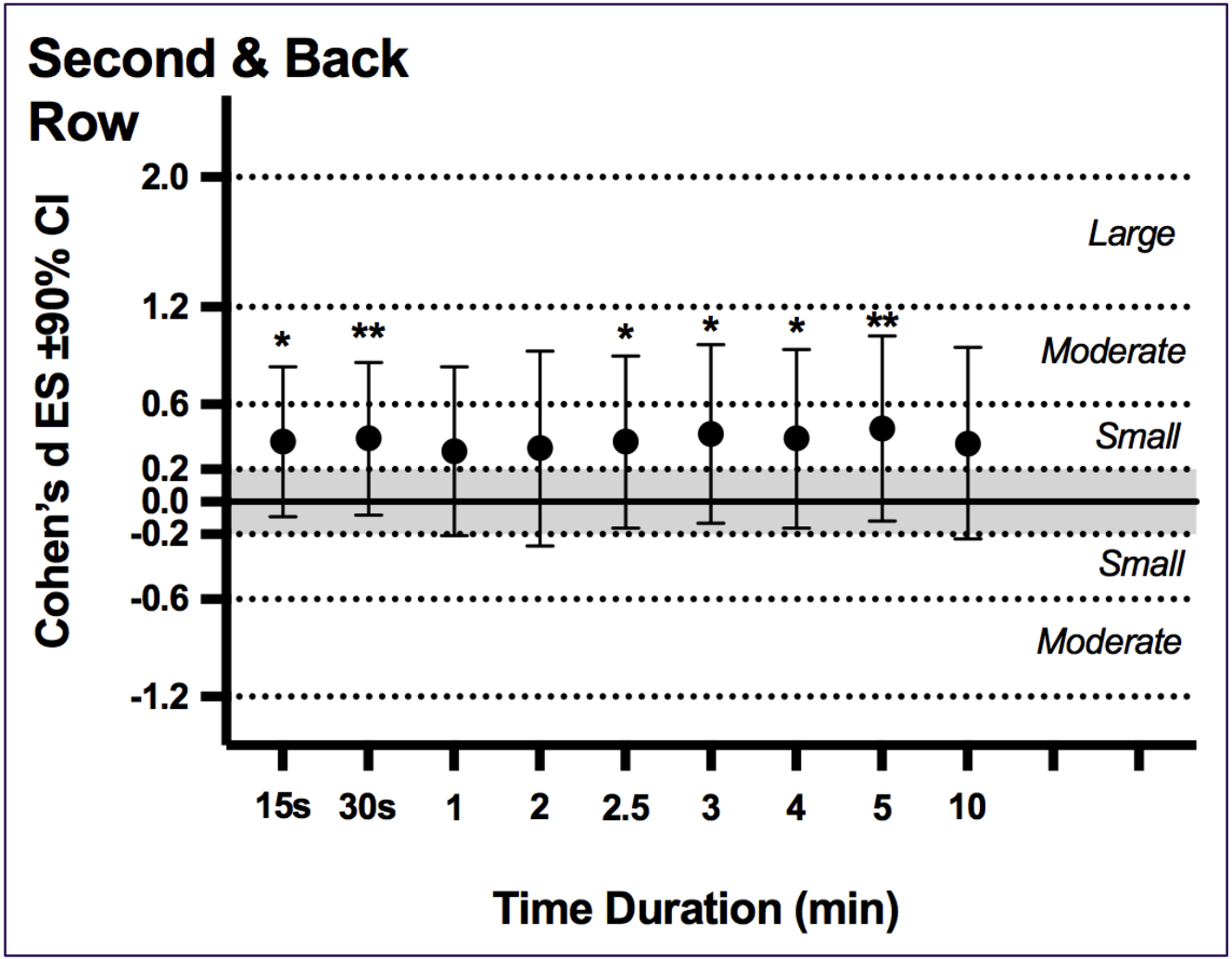




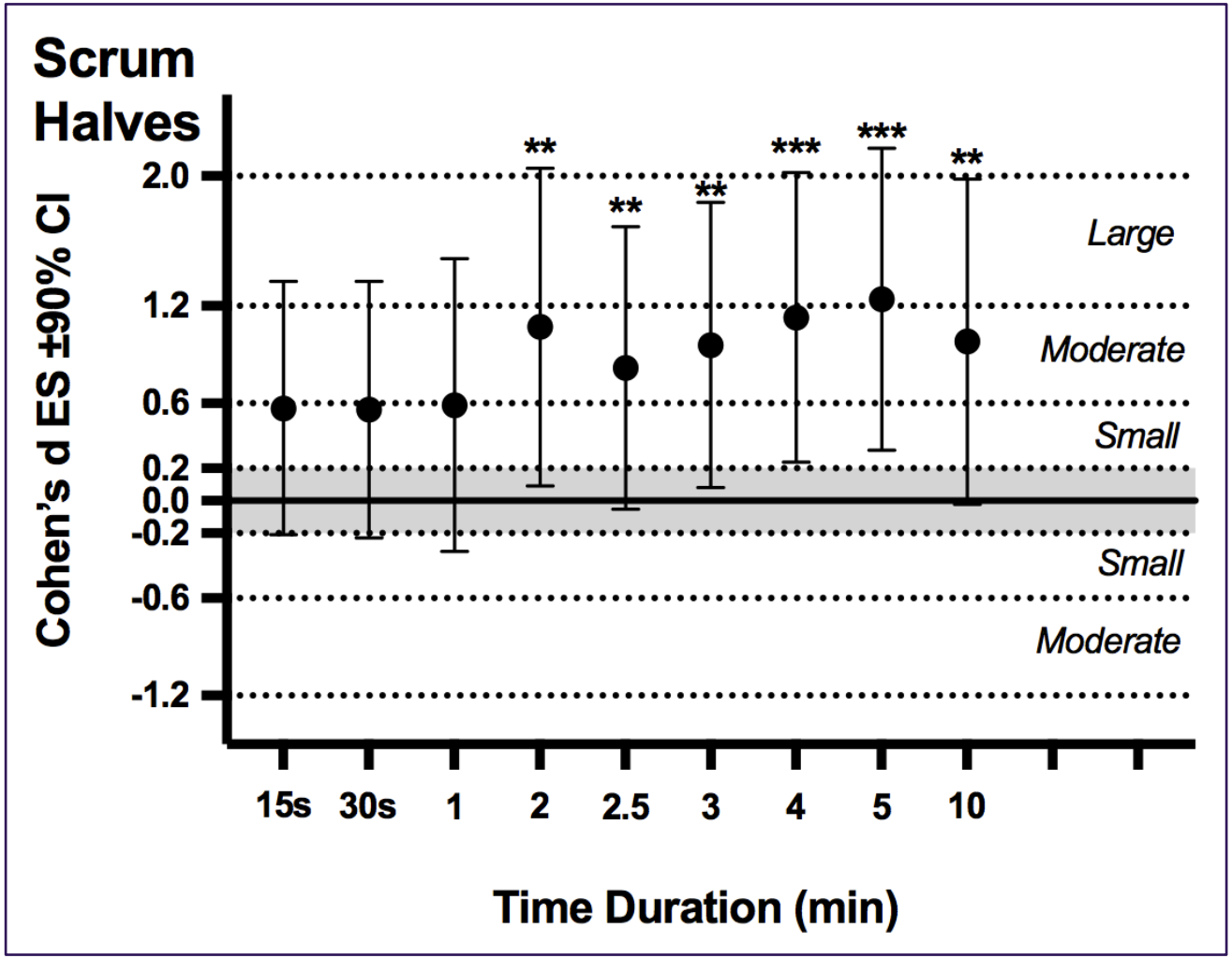
2.


Front Row
Cohen's d ES ±90% CI
2.0
1.2
0.6
0.2
0.0
-0.2
-0.6
-1.2
Large
Moderate
Small
Small
Moderate
****
****
****
****
****
****
****
***
15s
30s
1
2
2.5
3
4
5
10
Time Duration (min)

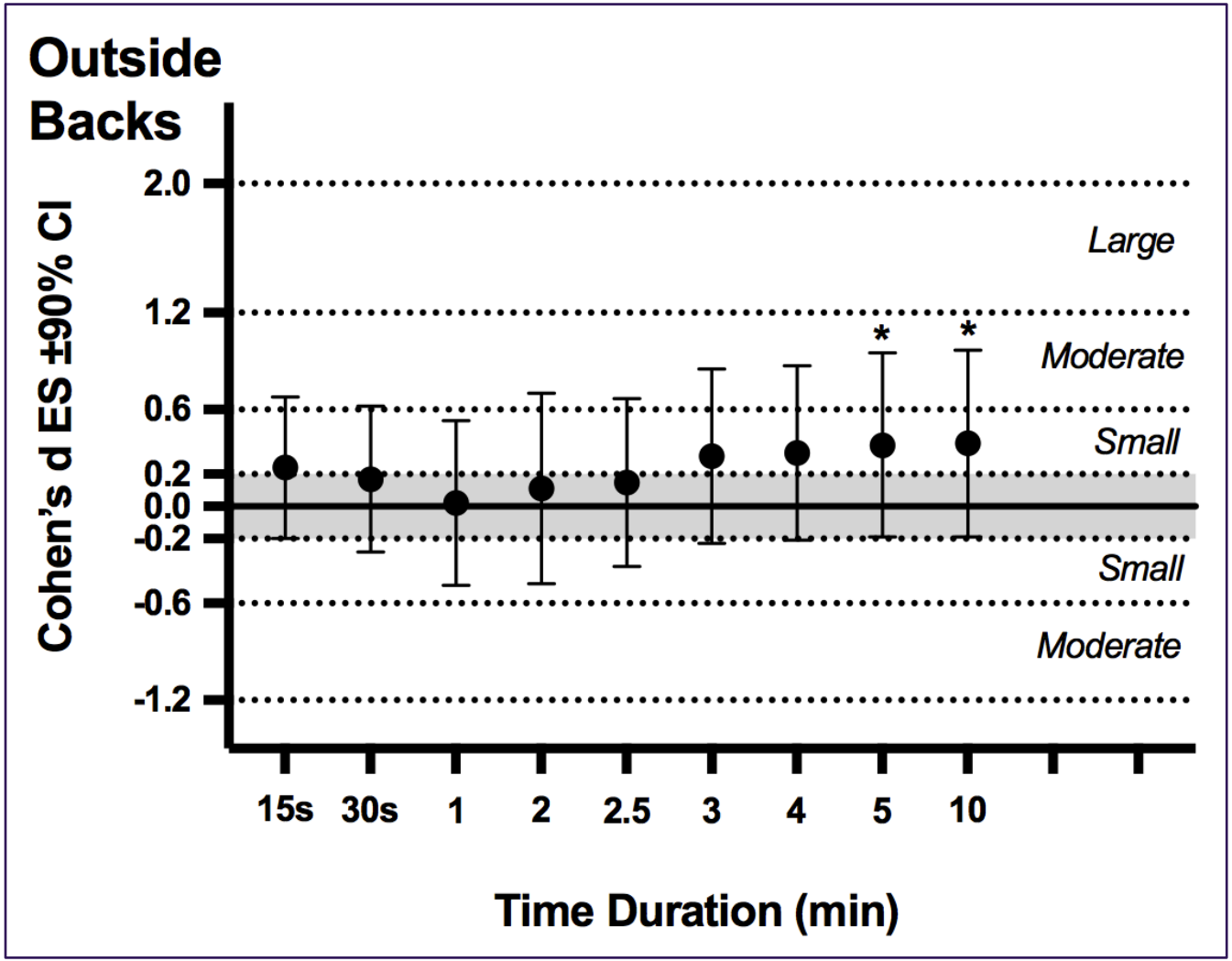
2.


Second & Back Row
Cohen's d ES ±90% CI
2.0
1.2
0.6
0.2
0.0
-0.2
-0.6
-1.2
Large
Moderate
Small
Small
Moderate
*
**
*
*
*
**
15s
30s
1
2
2.5
3
4
5
10
Time Duration (min)

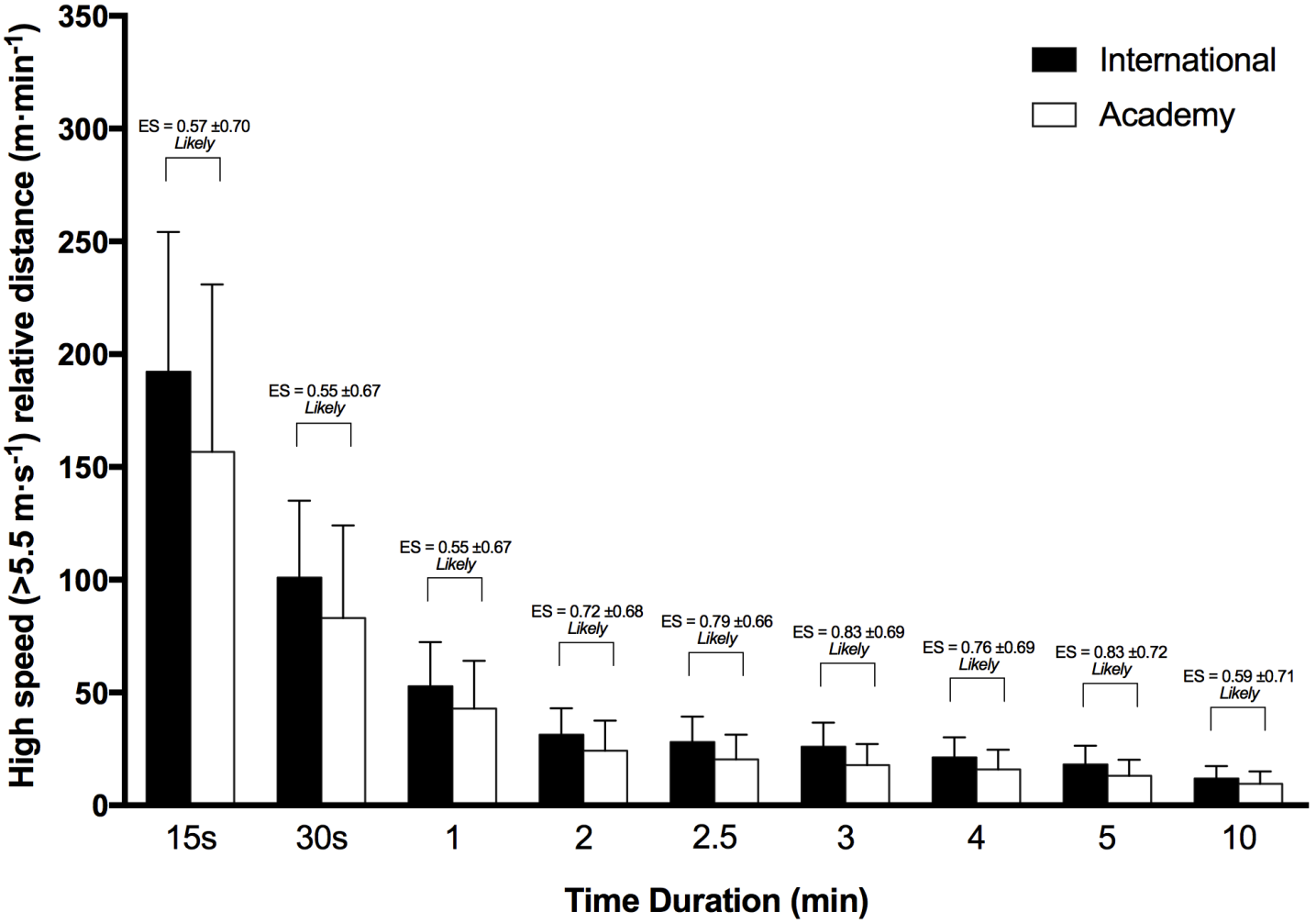
2.


Scrum Halves
Cohen's d ES ±90% CI
2.0
1.2
0.6
0.2
0.0
-0.2
-0.6
-1.2
Large
Moderate
Small
Small
Moderate
**
**
**
***
***
**
15s
30s
1
2
2.5
3
4
5
10
Time Duration (min)

2.


Outside Backs
Cohen's d ES ±90% CI
2.0
1.2
0.6
0.2
0.0
-0.2
-0.6
-1.2
Large
Moderate
Small
Small
Moderate
*
*
15s
30s
1
2
2.5
3
4
5
10
Time Duration (min)

3.


International
Academy
High speed (>5.5 m·s-1) relative distance (m·min-1)
350
300
250
200
150
100
50
0
ES = 0.57 ±0.70
Likely
ES = 0.55 ±0.67
Likely
ES = 0.55 ±0.67
Likely
ES = 0.72 ±0.68
Likely
ES = 0.79 ±0.66
Likely
ES = 0.83 ±0.69
Likely
ES = 0.76 ±0.69
Likely
ES = 0.83 ±0.72
Likely
ES = 0.59 ±0.71
Likely
15s
30s
1
2
2.5
3
4
5
10
Time Duration (min)

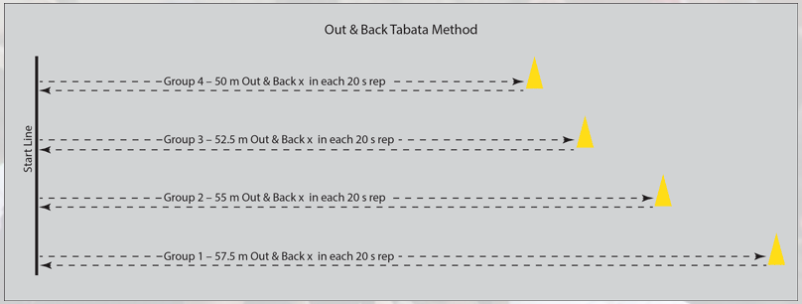
Summary

2.
The maximum locomotor intensities (relative distance) largely showed *unclear* results between international and academy players.

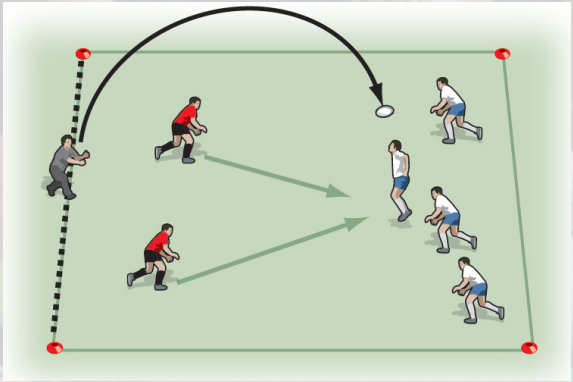
2.
The maximum locomotor intensities (high-speed relative distance (>5.5 $m \cdot s^{-1}$)) were greater for international front row players (*moderate* and *large* effects), greater in selected time durations for back and second row (*small* effects), scrum halves (*moderate* and *large* effects) and outside backs (*small* effects).

3.
The maximum locomotor intensities (high-speed relative distance (>5.5 $m \cdot s^{-1}$)) were greater for international players that represented both playing levels.

Practical Applications



Longest ball in play period = 2.5 min

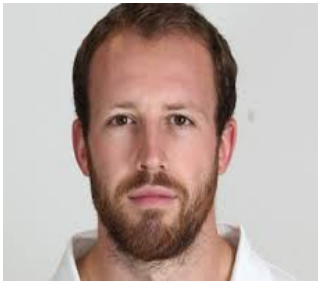


	FR	SR & BR	SH	OB
Total Distance (m)	298	305	363	335
Relative Distance ($m \cdot min^{-1}$)	119	122	145	134
High-Speed Total Distance (m)	45	60	105	88
High-Speed Relative Distance ($m \cdot min^{-1}$)	18	24	42	35

Professor Kevin Till

Nicholas Dalton-Barron

Professor Ben Jones



Grant Beasley

This research, travel and conference fees were funded by the Carnegie School of Sport, Leeds Beckett University, UK

CATAPULT

England Rugby

LBU LEEDS BECKETT UNIVERSITY

YORKSHIRE CARNEGIE RUGBY

ECSS DUBLIN 2018

@DaleRead4

Questions
(or any comments) welcome

Dale Read
d.read@leedsbeckett.ac.uk
@DaleRead4